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EXAMINER

CHANKONG, DOHM

ART UNIT PAPER NUMBER

2152

DATE MAILED: 06/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/059,760

Applicant(s)

VALDEVIT ET AL.

Examiner

Dohm Chankong

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-43 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-43 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

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DETAILED ACTION

- 1> Claims 1-43 are presented for examination. This action is a non-final rejection.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

- 2> Claims 1-31 and 33-38 are rejected under 35 U.S.C § 102(e) as being anticipated by Wrenn, U.S Patent No. 6.847.647.

- 3> As to claim 1, Wrenn discloses a method for in-order delivery of data within sequence from a first communication device to second communication device in a system including a fabric, the method comprising:

receiving at the first communication device a data frame destined for the second communication device [column 4 «lines 3-9»];

retrieving sequence information from said data frame, wherein data frames with the same sequence information require in-order delivery [column 4 «lines 10-22» where :

Wrenn's OX_ID is analogous to sequence information];

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utilizing said sequence information to calculate a hash function [Figure 3 | Figure 3D | column 4 «lines 14-24»]; and

based on the calculated hash function, selecting one of a predetermined set of paths through the fabric connecting the first communication device to the second communication device [column 4 «lines 10-22»].

4> As to claim 2, Wrenn discloses the method of claim 1, further comprising:

routing said data frame over the selected path to the second communication device [Figure 1 | column 5 «lines 4-7»].

5> As to claim 3, Wrenn discloses the method of claim 1, wherein the fabric is comprised of a plurality of interconnected Fibre Channel switches [column 5 «lines 4-7»].

6> As to claim 4, Wrenn discloses the method of claim 1 wherein the first communication device is a Fibre Channel switch [column 6 «lines 30-39» | claim 1].

7> As to claim 5, Wrenn discloses the method of claim 1, wherein the second communication device is an end device in communication with the fabric [Figure 1 | column 4 «lines 4-7»].

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8> As to claim 6, Wrenn discloses the method of claim 1, wherein said sequence information includes information in at least one pre-selected field of a header of said data frame [Figure 3].

9> As to claim 7, Wrenn discloses the method of claim 1, wherein said hash function equals to the last digit of the sum of all values in said at least one pre-selected header field included in said sequence information [column 8 «lines 56-65»].

10> As to claim 8, Wrenn discloses the method of claim 1, wherein said sequence information includes information in a source identifier field and destination identifier field of a header of said data frame [Figure 3 «items 300, 302» | column 6 «lines 16-39»].

11> As to claim 9, Wrenn discloses the method of claim 1, wherein said sequence information includes information in at least one exchange identifier field of a header of said data frame [Figure 3 «item 304» | column 6 «lines 16-22»].

12> As to claim 10, Wrenn discloses the method of claim 1, wherein each of said predetermined set of paths connecting the first communication device to the second communication device comprises a series of links between ports on adjacent communication devices [column 5 «line 59» to column 6 «line 15» | column 6 «lines 30-39»].

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13> As to claim 11, Wrenn discloses the method of claim 1, wherein each of said predetermined set of paths satisfies specified requirements on availability and on cost efficiency [column 7 «lines 31-58»].

14> As to claim 12, Wrenn discloses the method of claim 1 wherein selecting one of a predetermined set of paths further comprises:

selecting one of a plurality of fields in an entry of a multiple-field routing table, wherein each field in the entry corresponds to one of said predetermined set of paths [column 7 «line 31» to column 8 «line 41»].

15> As to claim 13, Wrenn discloses the method of claim 12, wherein every value of the hash function is associated with a field in the entry of said multiple-field table [column 7 «lines 10-25»].

16> As to claim 14, Wrenn discloses the method of claim 12, further comprising:

forwarding said data frame to a transmit port within the first communication device based on said selected field in the entry of said multiple-field routing table, wherein said selected path originates at said transmitting port [column 7 «line 10» to column 8 «line 41»].

17> As to claim 15, Wrenn discloses the method for in-order delivery of data within sequence from a first communication device to a second communication device in a system including a fabric, the method comprising:

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receiving at the first communication device in a plurality of data frames destined for the second communication device [column 4 «lines 3-9»];

retrieving sequence information from each of said plurality of data frames [column 7 «lines 1-25»];

based on said retrieved sequence information, categorizing said plurality of data frames into a plurality of sequences, wherein each of said plurality of sequences requires in-order delivery [column 4 «lines 10-22» | column 7 «lines 26-30»]; and

selecting for each of said plurality of sequences one of a predetermined set of paths through the fabric connecting the first communication device to the second communication device [column 4 «lines 1-9» | column 26-47»].

18> As to claim 16, Wrenn discloses the method of claim 15, further comprising:

routing said plurality of data frames over said predetermined set of paths, wherein all data frames belonging to a sequence use said selected path for said sequence [column 7 «lines 26-31»].

19> As to claim 17, Wrenn discloses the method of claim 15, wherein said sequence information from each of said plurality of data frames includes information in at least one pre-selected field of a header of said data frame [Figure 3].

20> As to claim 18, Wrenn discloses the method of claim 15, wherein each of said plurality of sequences includes data frames with a same source device and a same destination device

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[column 7 «lines 10-30» where : Wrenn discloses the frames of the same exchange follow the same path, implying that the frames go to the same switches. Therefore, the sequence of data frames in the same exchange must have a same source device and a same destination device to be able to follow the same path through the fabric].

21> As to claim 19, Wrenn discloses the method of claim 15, wherein each of said plurality of sequences includes data frames within a same Fibre Channel exchange [column 7 «lines 26-31»].

22> As to claim 20, Wrenn discloses the method of claim 15, wherein categorizing the plurality of data frames into a plurality of sequences further comprises:

associating an arbitrary number with all data frames corresponding to each of said plurality of sequences [column 4 «lines 10-14» | column 6 «lines 16-23» | column 7 «lines 1-9» where : Wrenn associates an address 362 with the data frames, the address generated by hashing the identifiers in the header].

23> As to claim 21, Wrenn discloses the method of claim 20, wherein associating an arbitrary number with all data frames corresponding to each of the plurality of sequences further comprises:

associating an arbitrary number with each set of sequence of information [column 4 «lines 10-14» | column 7 «lines 1-9»].

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24> As to claim 22, Wrenn discloses the method of claim 21, wherein said arbitrary number corresponding to each set of sequence information is a hash function calculated from said set of sequence information [column 6 «lines 60-67» | column 7 «lines 1-25»].

25> As to claim 23, Wrenn discloses the method of claim 20, wherein selecting for each of the plurality of sequences one of a predetermined set of paths further comprises:

selecting, for each of said plurality of sequences, one of a predetermined set of paths based on said arbitrary number associated with the sequence [column 6 «lines 60-67» where : Wrenn's hash function generated address 354 is used to locate an entry in the routing table].

26> As to claim 24, Wrenn discloses the method of claim 15, wherein selecting for each of the plurality of sequences one of a predetermined set of paths further comprises:

selecting, for each of said plurality of sequences, one of a plurality of fields in an entry to a multiple-field routing table, wherein each field in said entry corresponds to one of said predetermined set of paths [column 6 «lines 40-48» | column 7 «lines 10-25»].

27> As to claim 25, Wrenn discloses a method for in-order delivery of data within sequence from a first communication device to a second communication device in a system including a fabric, the method comprising:

identifying at least one header field as the basis for categorizing data frames into a plurality of sequences, wherein each sequence requires in-order delivery [Figure 3 | column 7 «lines 26-30»];

selecting a set of paths through the fabric connecting the first communication device to the second communication device [column 7 «lines 10-25»]; and

constructing an entry of a multiple-field routing table, wherein each field in the entry corresponds to one of said selected set of paths and wherein at least one field is associated with each of said selected paths [column 7 «lines 10-25 and 31-58»].

28> As to claim 26, Wrenn discloses the method of claim 25, further comprising:

upon receiving a data frame at the first communication device, routing the data frame to the second communication device based on header information of the data frame in said at least one header field, and the entry of said multiple-field routing table [column 6 «lines 30-48» | column 7 «lines 10-25»].

29> As to claim 27, Wrenn discloses the method of claim 26, wherein routing the data frame to the second communication device further comprises the steps performed at the first communication device of:

retrieving said header information from the data frame [column 6 «lines 16-29»];

utilizing said header information to calculate a hash function [column 6 «line 49» to column 7 «line 9»];

choosing one of said selected paths based on said calculated hash function and said entry of said multiple-field routing table [column 7 «lines 31-46»]; and

routing the data frame over said selected path to the second communication device [column 7 «lines 26-46»].

30> As to claim 28, Wrenn discloses the method of claim 25, wherein:

each of said plurality of sequences includes data frames with a same source device and a same destination device [column 7 «lines 10-30» where : Wrenn discloses the frames of the same exchange follow the same path, implying that the frames go to the same switches.

Therefore, the sequence of data frames in the same exchange must have a same source device and a same destination device to be able to follow the same path through the fabric], and

said at least one header field includes a source identifier field and a destination identifier field [Figure 3].

31> As to claim 29, Wrenn discloses the method of claim 25, wherein:

each of said plurality of sequences includes data frames within a same Fibre Channel exchange [column 7 «lines 26-30»], and

said at least one header field includes an originator exchange identifier field and an responder exchange identifier field [column 6 «lines 16-29»].

32> As to claim 30, Wrenn discloses the method of claim 25, wherein selecting a set of paths through the fabric connecting the first communication device to the second communication device further comprises:

selecting a set of paths among all paths through the fabric connecting the first communication device to the second communication device based on specified requirements on availability and on cost efficiency [column 7 «lines 31-58»].

33> As to claim 31, Wrenn discloses the method of claim 25, wherein each of a subset of said selected paths is associated with more than one field in the entry of said multiple-field routing table [column 7 «line 31» to column 8 «line 41»].

34> As to claim 33, Wrenn discloses the method of claim 25, wherein each of a subset of said selected paths is associated with a weighting factor [column 7 «lines 43-47»].

35> As to claim 34, Wrenn discloses a switch for in-order delivery of data within sequence through a fabric from a first communication device to a second communication device, the system comprising:

a data reception module for receiving from the first communication device a plurality of data frames destined for the second communication device [column 6 «lines 30-39»];

a sequence identification module for retrieving sequence information from each of said plurality of data frames and for utilizing said retrieved sequence information to categorize said plurality of data frames into a plurality of sequences, wherein each of said plurality of sequences requires in-order delivery [column 6 «lines 30-59»];

a path selection module for selecting for each of said plurality of sequences one of a predetermined set of paths through the fabric connecting the first communication device to the second communication device [column 6 «lines 30-67»]; and

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a data transmission module for routing said plurality of data frames over said predetermined set of paths, wherein all data frames belonging to a sequence use said selected path for the sequence [column 6 «lines 30-67» | column 7 «lines 26-30»].

36> As to claim 35, Wrenn discloses the switch of claim 34, wherein the sequence identification module further comprises:

a computation module for calculating a hash function from sequence information retrieved from each of said plurality of data frames [column 6 «lines 49-59»]; and

a data association module for associating said hash function calculated from said sequence information of each of said plurality of data frames with one of said plurality of sequences [column 7 «lines 1-9» | column 8 «lines 15-32»].

37> As to claim 36, Wrenn discloses the switch of claim 35, wherein the path selection module further comprises:

a path assignment module for assigning one of a predetermined set of paths to each of said plurality of sequences based on said calculated hash function associated with said sequence [column 7 «lines 10-25»].

38> As to claim 37, Wrenn discloses the switch of claim 34, wherein the path selection module further comprises:

a multiple field routing table including an entry for said selected set of paths, wherein

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each field in said entry corresponds to one of said selected set of paths and wherein at least one field is associated with each of said selected paths [column 6 «lines 40-48»]; and

a field assignment module for assignment one of said multiple fields of said entry to said multiple-field routing table to each of said plurality of sequences [column 6 «line 40» to column 7 «line 25»].

39> As to claim 38, Wrenn discloses the switch of claim 34, further comprising:

a preprocessing module for identifying at least one header field as the basis for the categorization of data frames into a plurality of sequences, and for selecting a set of paths through the fabric connecting the first communication device to the second communication device [Figure 3 | column 6 «lines 16-59»].

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

40> Claim 32 is rejected under 35 U.S.C § 103(a) as being unpatentable over Wrenn in view of Fletcher, U.S Patent No. 6,072,797.

41> Wrenn does not explicitly disclose each path within the subset has higher bandwidth than any of the selected paths outside the subset.

42> In the same field of invention, Fletcher discloses each path within a subset has higher bandwidth than any of the selected paths outside the subset [column 2 «lines 26-33» | column 3 «lines 5-48» | column 7 «lines 39-43»]. It would have been obvious to one of ordinary skill in the art to have incorporated link (path) aggregation by the speed of the bandwidth. Link aggregation and its advantages are ubiquitous and quite well known in the art. One would have been motivated to group Wrenn's paths into a group of higher bandwidth so paths of similar characteristics are grouped together for optimal performances of all the paths in the same group.

43> Claims 39-43 are rejected under 35 U.S.C § 103(a) as being unpatentable over Wrenn, in view of an Official Notice.

44> As to claim 39, Wrenn discloses a Fibre Channel network comprising:

a source device for providing a plurality of data frames comprising a sequence, each of said data frames including sequence information [Figure 1 | Figure 3];

a target device for receiving said plurality of data frames from said source device [Figure 1];

a Fibre Channel fabric connecting said source and target devices [column 3 «line 66» to column 4 «line 9»], said Fibre Channel fabric including:

a first switch having an input coupled to said source device and having two outputs [Figure 1];

second and third switches, each of said second and third switches having an input coupled to one of said first switch outputs and having an output [Figure 1 | column 5 «lines 3-16»];

a fourth switch having two inputs, each coupled to one of the outputs of said second and third switches and having an output coupled to said target device, so that a sequence from said source device to said target device can be transmitted through either of said second or third switches [Figure 1 | column 5 «lines 3-16»],

wherein said first switch including the limitations of claim 34 [see claim 34, supra].

While Wrenn does not explicitly disclose four switches as claimed, he does disclose three switches that perform the same functionality of the claimed limitations. Furthermore, it is well known, and stated by Wrenn, that his fabric may consist of 2 or more switches. Therefore, Official Notice is taken that it would have been obvious to one of ordinary skill in the art to incorporate a fourth switch into Wrenn's fabric to enable even more paths with which the frames can travel.

45> As to claims 40-43, as they do not teach or further define over the claimed limitations of claims 35-38, respectively, they are similarly rejected for the same reasons set forth for claims 35-38.

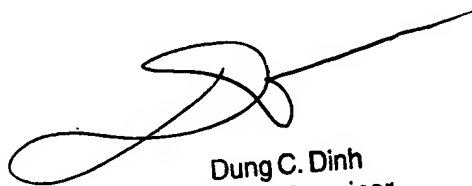
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dohm Chankong whose telephone number is (571)272-3942. The examiner can normally be reached on 8:30AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenton Burgess can be reached on (571)272-3949. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DC



Dung C. Dinh
Primary Examiner